Facility Facts & Figures

The National Synchrotron Light Source (NSLS) is a national user research facility funded by the U.S. Department of Energy's Office of Basic Energy Science. The NSLS operates two electron storage rings: an x-ray ring (2.8 GeV, 280 mA) and a vacuum ultraviolet (VUV) ring (800 meV, 1.0 A), which provide intense light spanning the electromagnet spectrum from the infrared through x-rays. The properties of this light, and the specially designed experimental stations, called beamlines, allow scientists in many fields of research to perform experiments not otherwise possible at their own laboratories.

Over 2,200 scientists representing more than 350 institutions, more than 50 of them corporations, come to Brookhaven National Laboratory annually to conduct research at the NSLS. The facility operates seven days a week, 24 hours a day throughout the year, except during periods of maintenance and studies.

As a national user facility, the NSLS does not charge for its beamtime, providing that the research results are published in the open literature. Proprietary research is conducted on a full cost recovery basis.

There are two ways to obtain beamtime at the NSLS: either as a General User or as a member of a Participating Research Team (PRT). General Users are independent investigators interested in using the NSLS for their research. Access is gained through a peer-reviewed proposal system. All operational beamlines at the NSLS reserve at least 25% of their available beamtime for General Users. PRTs are groups of researchers with related interests from one or more institutions. Membership in a PRT is open to all members of the scientific community who can contribute significantly to the program of the PRT, (i.e., funding, contribution of equipment, scientific program, design and engineering, operations manpower, etc).

The NSLS currently has 54 x-ray and 16 VUV-IR operational beamlines for performing a wide range of experiments. The following pages list the operational beamlines at the NSLS and their unique characteristics.

Beamline Guide

Technique	Description
ARPES	UV photoelectron spectroscopy, angle-resolved
DAFS	X-ray diffraction anomalous fine structure
DEI	Diffraction-enhanced imaging
EXAFS	X-ray absorption spectroscopy, extended fine structure
IRMS	Infrared microspectroscopy
MAD	Multi-Wavelength anomolous dispersion
MCD	Magnetic circular dichroism
NEXAFS	Near edge x-ray absorption spectroscopy
SAXS	Small angle x-ray scattering
SPARPES	UV photoelectron spectroscopy, spin- and angle-resolved
STXM	Scanning transmission x-ray microscopy
UPS	UV photoelectron spectroscopy
UV-CD	Ultraviolet circular dichroism
WAXD	Wide-angle x-ray diffraction
WAXS	Wide-angle x-ray scattering
XAFS	X-ray absorption spectroscopy, fine structure
XANES	X-ray absorption spectroscopy, near edge structure
XAS	X-ray absorption spectroscopy
XPS	X-ray photoelectron spectroscopy
XRD	X-ray diffraction
XSW	X-ray standing waves

BEAMLINE	SOURCE	TYPE OF RESEARCH	ENERGY RANGE	ORGANIZATION
U1A	Bend	XAS XAFS NEXAFS XANES	270-900 eV	ExxonMobil Research and Engineering Co.
U2A	Bend	IRMS High pressure research IR spectroscopy	30-8000 cm-1	Carnegie Institution of Washington
U2B	Bend	IRMS IR spectroscopy	50-4000 cm-1	Albert Einstein College of Medicine
U3C	Bend	XPS	50-1000 eV	Bechtel Nevada Lawrence Livermore National Laboratory Los Alamos National Laboratory Sandia National Laboratory
U4A	Bend	UPS	10-250 eV	Army Research Laboratory Boston University BNL-NSLS North Carolina State University Rutgers University University of North Carolina
U4B	Bend	X-ray scattering, resonant MCD UPS X-ray fluorescence spectroscopy XPS	20-1200 eV	BNL-NSLS Montana State University
U4IR	Bend	IRMS	50-700 cm-1	BNL-Chemistry BNL-NSLS
U5UA	Insertion Device	Magnetospectroscopy UPS ARPES SPARPES	15-150 eV	BNL-NSLS
U7A	Bend	NEXAFS XANES XPS	180-1200 eV	BNL-Chemistry BNL-Physics Dow Chemical Company National Institute of Standards & Technology Rutgers University Texas A&M University University of Michigan
U9B	Bend	UV-CD UV fluorescence spectroscopy	0.8 - 8.0 eV	BNL-Biology BNL-NSLS
U10A	Bend	IR spectroscopy	30-20000 cm-1	BNL-NSLS BNL-Physics
U10B	Bend	IRMS IR spectroscopy	500-4000 cm-1	BNL-NSLS
U11	Bend	UV photoabsorption spectroscopy UPS UV photoionization spectroscopy	3-30 eV	BNL-Biology BNL-NSLS
U12A	Bend	XAS XPS	100-800 eV	BNL-NSLS Oak Ridge National Laboratory
U12IR	Bend	IR spectroscopy THz / millimeter wave spectroscopy Time-resolved spectroscopy	6-600 cm-1	BNL-NSLS Stony Brook University University of Florida
U13UB	Insertion Device	UPS ARPES	3-30 eV	Boston University BNL-NSLS BNL-Physics

BEAMLINE	SOURCE	TYPE OF RESEARCH	ENERGY RANGE	ORGANIZATION
X1A1	Insertion Device	STXM	.25-.50 keV	BNL-Environmental Science BNL-NSLS ExxonMobil Research and Engineering Co. SUNY @ Plattsburgh Stony Brook University University of Texas @ Houston
X1A2	Insertion Device	STXM	.25-1 keV	Stony Brook University
X1B	Insertion Device	X-ray scattering, coherent XAS X-ray fluorescence spectroscopy XPS	.2-1.6 keV	Boston University BNL-NSLS University of Groningen
X2B	Bend	X-ray microtomography	8-35 keV	ExxonMobil Research and Engineering Co.
X3B1	Bend	XRD, powder	6-30 keV	Stony Brook University
X4A	Bend	MAD Macromolecular crystallography	3.5-20 keV	Albert Einstein College of Medicine City University of New York (CUNY) Columbia University Cornell University Mount Sinai School of Medicine New York Structural Biology Center New York University SUNY @ Buffalo Sloan-Kettering Institute for Cancer Research Wadsworth Center
X4C	Bend	MAD Macromolecular crystallography	7-20 keV	Albert Einstein College of Medicine City University of New York (CUNY) Columbia University Cornell University Mount Sinai School of Medicine New York Structural Biology Center New York University Rockefeller University SUNY @ Buffalo Sloan-Kettering Institute for Cancer Research Wadsworth Center
X5A	Bend	Laser backscattering	150-420 MeV	BNL-Physics Forschungszentrum Juelich (KFA) James Madison University Norfolk State University Ohio University University of Paris University of Rome II University of South Carolina University of Virginia Virginia Polytechnic Institute and State University
X6A	Bend	MAD Macromolecular crystallography	6.0-23 keV	BNL-NSLS National Institutes of Health
X6B	Bend	MAD Macromolecular crystallography	7-19 keV	BNL-NSLS
X7A	Bend	XRD, powder	5-45 keV	BNL-Physics ChevronTexaco Energy Research and Technology Co. Ohio State University Stony Brook University University of Birmingham University of California @ Santa Barbara University of Pennsylvania
X7B	Bend	XRD, single crystal XRD, time resolved WAXD WAXS	5-21 keV	BNL-Chemistry

BEAMLINE	SOURCE	TYPE OF RESEARCH	ENERGY RANGE	ORGANIZATION
X8A	Bend	Metrology	1.0-5.9 keV	Bechtel Nevada Lawrence Livermore National Laboratory Los Alamos National Laboratory Sandia National Laboratory
X8C	Bend	MAD Macromolecular crystallography	5-19 keV	Biogen Incorporated BNL-Biology Hoffmann-La Roche National Research Council of Canada
X9A	Bend	MAD Macromolecular crystallography	5-15 keV	Albert Einstein College of Medicine Rockefeller University Sloan-Kettering Institute for Cancer Research
X9B	Bend	XAS EXAFS XAFS NEXAFS XANES	5-15 keV	Albert Einstein College of Medicine
X10A	Bend	XRD, powder XRD, time resolved WAXD X-ray reflectivity SAXS WAXS	6-15.2 keV	ExxonMobil Research and Engineering Co.
X10B	Bend	XRD, powder XRD, surface WAXD X-ray reflectivity X-ray scattering, surface WAXS	14 keV	ExxonMobil Research and Engineering Co.
X10C	Bend	XAS EXAFS XAFS NEXAFS XANES	4-24 keV	ExxonMobil Research and Engineering Co.
X11A	Bend	DAFS XAS EXAFS XAFS NEXAFS XANES	4.5-35 keV	BNL-Environmental Science Canadian Light Source Hunter College Naval Research Laboratory (NRL) Naval Surface Warfare Center New Jersey Institute of Technology North Carolina State University Northeastern University Paul Scherrer Institute U.S. Environmental Protection Agency Virginia Union University
X11B	Bend	DAFS XAS EXAFS XAFS NEXAFS XANES	5.0-23 keV	BNL-Environmental Science Canadian Light Source Hunter College Naval Research Laboratory (NRL) Naval Surface Warfare Center New Jersey Institute of Technology North Carolina State University Northeastern University Paul Scherrer Institute U.S. Environmental Protection Agency University of Connecticut Virginia Union University
X12B	Bend	MAD Macromolecular crystallography	5-20 keV	BNL-Biology
X12C	Bend	MAD Macromolecular crystallography	5.5-20.0 keV	BNL-Biology
X13A	Insertion Device	X-ray scattering, resonant MCD Magnetospectroscopy	.2-1.8 keV	BNL-NSLS

BEAMLINE	SOURCE	TYPE OF RESEARCH	ENERGY RANGE	ORGANIZATION
X13B	Insertion Device	Microdiffraction Imaging	4-16 KeV	BNL-NSLS
X14A	Bend	MAD XRD, powder XRD, single crystal XRD, time resolved WAXD X-ray reflectivity	5-26 keV	Oak Ridge National Laboratory Tennessee Technological University University of Tennessee
X15A	Bend	XSW DEI	3-25keV XSW 10-60keV DEI	Argonne National Laboratory BNL-NSLS Canadian Light Source Illinois Institute of Technology North Carolina State University Northwestern University University of North Carolina University of Saskatchewan
X15B	Bend	XAS EXAFS XAFS NEXAFS XANES	0.8-15 keV	BNL-Environmental Sceinces Lucent Technologies, Inc. Stony Brook University Temple University University of Texas @ Austin
X16C	Bend	XRD, powder XAS XAFS	4.5-25 keV	BNL-NSLS Yeshiva University
X17B1	Insertion Device	XRD, powder	White Beam 55-80 keV	BNL-Medical BNL-NSLS
X17B2	Insertion Device	XRD, powder	White Beam 55-80 keV	Stony Brook University
X17B3	Insertion Device	XRD, powder XRD, single crystal High pressure research	5-80 keV	BNL-NSLS Carnegie Institution of Washington
X17C	Insertion Device	XRD, powder XRD, single crystal High pressure research	5-80 keV	Carnegie Institution of Washington Lawrence Livermore National Laboratory Naval Research Laboratory (NRL) University of Chicago
X18A	Bend	XRD, powder XRD, single crystal XRD, surface WAXD X-ray reflectivity X-ray scattering, surface WAXS	4-19 keV	BNL-Department of Materials Sciences BNL-NSLS General Electric Indiana University @ Indianapolis Pennsylvania State University Purdue University University of Maryland University of Missouri @ Columbia
X18B	Bend	XAS EXAFS XAFS NEXAFS XANES	5.7-40 keV	BNL-Chemistry BNL-NSLS General Electric Natural Resources Canada North Carolina State University Rutgers University UOP University of Kentucky
X19A	Bend	XAS EXAFS XAFS NEXAFS XANES	2.1-17 keV	BNL-NSLS BNL-Chemistry Department General Electric Natural Resources Canada North Carolina State University Rutgers University UOP University of Kentucky

BEAMLINE	SOURCE	TYPE OF RESEARCH	ENERGY RANGE	ORGANIZATION
X19C	Bend	XRD, surface X-ray topography X-ray reflectivity X-ray scattering, liquid X-ray scattering, surface	6-17 keV	Army Research Laboratory Carnegie Mellon University Dartmouth College Johns Hopkins University Kansas State University National Aeronautics and Space Admin. (NASA) Stony Brook University University of Chicago University of Illinois @ Chicago University of Wisconsin
X20A	Bend	XRD, single crystal XRD, surface Microdiffraction Imaging X-ray reflectivity X-ray scattering, surface	4.5-13 keV	IBM Research Division
X20B	Bend	XRD, single crystal XRD, surface X-ray reflectivity X-ray scattering, surface	17.4 keV	IBM Research Division
X20C	Bend	XRD, single crystal XRD, surface XRD, time resolved X-ray reflectivity X-ray scattering, surface	4-11 keV	IBM Research Division
X21	Insertion Device	XRD, single crystal X-ray scattering, magnetic X-ray scattering, resonant SAXS	5-15 keV	BNL-NSLS
X22A	Bend	XRD, single crystal XRD, surface WAXD X-ray reflectivity X-ray scattering, surface WAXS	10 keV, 32 keV	BNL-Environmental Science BNL-Physics Rutgers University University of Maryland
X22B	Bend	XRD, surface X-ray scattering, liquid X-ray scattering, surface	6.5-10 keV	BNL-Physics Harvard University Rutgers University
X22C	Bend	XRD, single crystal XRD, surface X-ray reflectivity X-ray scattering, magnetic X-ray scattering, surface	3-12 keV	BNL-Physics Rutgers University University of Maryland
X23A2	Bend	XRD, powder DAFS XAS EXAFS XAFS NEXAFS XANES	4.7-30 keV	National Institute of Standards & Technology

BEAMLINE	SOURCE	TYPE OF RESEARCH	ENERGY RANGE	ORGANIZATION
X23B	Bend	XRD, powder XAS EXAFS XAFS NEXAFS XANES	3-10.5 keV	BNL-Environmental Science Canadian Light Source Hunter College Naval Research Laboratory (NRL) Naval Surface Warfare Center New Jersey Institute of Technology North Carolina State University Northeastern University Paul Scherrer Institute U.S. Environmental Protection Agency Virginia Union University
X24A	Bend	XSW Auger spectroscopy EXAFS X-ray fluorescence spectroscopy XPS	1.8-5 keV	National Institute of Standards & Technology
X24C	Bend	UV photoabsorption spectroscopy XAS	.006-1.8 keV	Naval Research Laboratory (NRL)
X25	Insertion Device	MAD Macromolecular crystallography	3-28 keV	BNL-Biology BNL-NSLS
X26A	Bend	Microdiffraction Imaging X-ray microprobe	3-30 keV	BNL-Environmental Science University of Chicago University of Georgia
X26C	Bend	MAD Macromolecular crystallography	5-20 keV	BNL-Biology Cold Spring Harbor Laboratory Stony Brook University
X27C	Bend	XRD, time resolved WAXD SAXS WAXS	9 keV	Basell USA, Inc. (formerly Montell) National Institute of Standards & Technology National Institutes of Health Naval Surface Warfare Center New Jersey Institute of Technology Stony Brook University U.S. Air Force
X28C	Bend	X-ray footprinting	White Beam	Albert Einstein College of Medicine
X29A	Insertion Device	MAD Macromolecular crystallography	6-15 keV	Albert Einstein College of Medicine BNL-Biology